Charcoal from the Congo Basin: palaeo-botanical evidence for climate change?

Hubau Wannes[1], Hans Beeckman[2] & Joris Van Acker[1]

[1] Ghent University, Faculty of Bioscience Engineering, Laboratory of Wood Technology
[2] Royal Museum for Central Africa (RMCA), Laboratory for Wood Biology

Tel: 09 264 62 05 **Fax**: 09 264 90 92 **E-mail:** Wannes.Hubau@UGent.be

Function: Scientific Personnel (PhD scholarship Special Research Fund)

Promotor: Prof. Dr. ir. Joris Van Acker (Ghent University)
Co-promotor: Dr. ir. Hans Beeckman (RMCA)

Project:

This PhD research examines the Central African refuge theory by means of vegetation reconstructions based on charcoal identification (= anthracology). Due to the colder and dryer climate during the Last Glacial Maximum (18.000 BP), the landscape in Central Africa was largely dominated by savanna vegetations. Relatively small forest patches could only survive in scattered regions with a humid microclimate. These refuge areas have been mapped based on (phyto)geographical, palynological and botanical evidence. Anthracology is a rather young branch of palaeobotanical science, but it can provide a vegetation reconstruction with a higher spatial resolution than pollen analysis. Therefore it will be applied to verify the refuge theory. Charcoal has an important archaeological value because the anatomical structure is preserved during the charcoalification process. Additionally, from a chemical point of view charcoal is an inert material persisting in deep soil profiles and geological layers for thousands of years.

Charcoal collections from pedological pits (charcoal from wildfires) and archaeological excavations (anthropogenic charcoal) are available at the Royal Museum for Central Africa. Two collections from southern Cameroon and one from Congo Brazza are dated up to 4.000 BP. A collection from Matupi Cave (Ituri, DRC) contains charcoal dated between 40.000 and 12.000 BP. All of these sampling sites are situated in between refuge areas. Own sampling will be conducted in the Luki reserve (Bas-Congo, DRC), around Tshela (Bas-Congo, DRC) and in the Yangambi reserve (Province Orientale, DRC). Luki and Tshela are situated in the Mayumbe hills, a submountainous refuge area. Charcoal will be sampled using standard methods.

Charcoal fragments are dated (^{14}C) and studied using reflected light microscopy (RLM). More detailed observations can be done using Scanning Electron Microscopy (SEM) and X-Ray computed microtomography (µCT). Observed anatomical features are listed using the IAWA codes. These descriptions are compared with wood anatomical descriptions on the InsideWood database and with thin sections of the reference collection in the Xylarium of the RMCA. Field inventories provide species lists which represent contemporary vegetation composition. From species not yet present in the Xylarium, wood samples are collected and thin sections are made. New anatomical descriptions of species are published on the InsideWood database.

Until now 20 fragments from an archaeological excavation in Bas-Nyong (Cameroon) have been studied using RLM and SEM. They belonged to 8 charcoal types from which 5 could be identified. Currently, identifications are preliminary and some fragments could not be identified yet. This will change progressively with the growing amount of knowledge on African wood anatomy. After identification, the final charcoal spectrum will represent the evolution of species composition in the region.